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# SETTLEMENT AND DEVELOPMENT OF THE LEAD AND ZINC MINING REGION OF THE DRIFTLESS AREA WITH SPECIAL EMPHASIS UPON JO DAVIESS COUNTY, ILLINOIS<sup>1</sup>

The upper Mississippi river lead and zinc mining region (figure 1) in the driftless area is a small geographic unit with a variety of internal and external relations, and therefore the

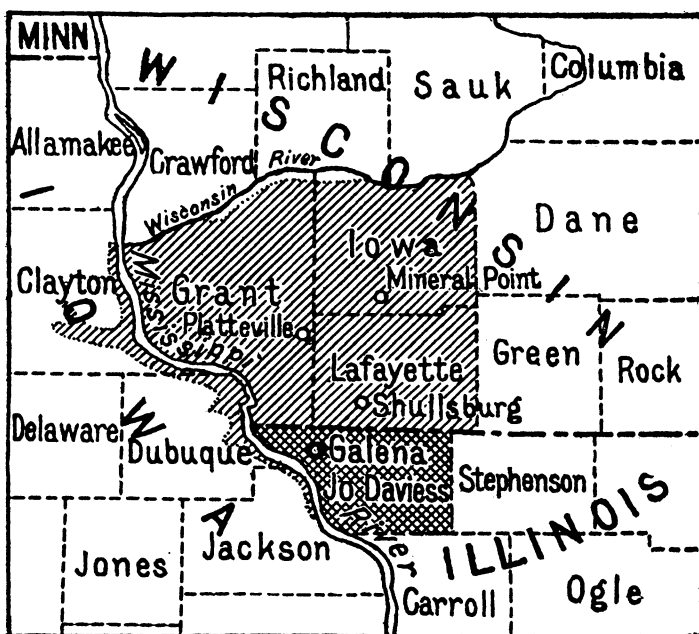


Figure 1. Map showing the position of Jo Daviess county in the lead and zinc district of the upper Mississippi river

region has afforded the setting for several eras of life development. It is the purpose of this paper briefly to sketch the environment and the life of these eras as being mutually interde-

<sup>1</sup> The above article, which is published by permission of the Illinois state geological survey, is based in part upon six weeks of field work in the region discussed and upon a master's thesis: "Settlement and development of Jo Daviess county,"

pendent and to emphasize some of the geographical influences which have affected the history of the region. The story will be confined largely to Jo Daviess county, Illinois, since this district has been studied in detail as being typical of the region as a whole.

Scarcely anything in detail is known concerning the life in the region before the coming of man, and little during the era of Indian supremacy. Later, in the beginning of the nineteenth century, the lead mineral attracted the whites from great distances, thus initiating the present era which has had three periods of development. The result was an early settlement of the region by a heterogeneous population, whose first interest was mining. During this mining period, intercourse was chiefly with the south because the country was located on the Mississippi river; hence its early population and institutions show a strong southern influence. But after 1832 the Hudson river, the Erie canal, and the great lakes directed eastern and New England emigrant farmers into the region, and it passed into its mining-farming period. The inrush of farmers was followed by a gradual and substantial development in agriculture. The immigrants impressed upon the region eastern and New England institutions, which were modified, however, by the new conditions. After 1845 the lead-mining activities of the region began to decline. This decline brought about the farming-mining period, which has

written by the author for the university of Chicago, 1913. In addition the following sources have been used: *Niles' Weekly Register*; *Merchants' magazine and commercial review*; *DeBow's review*; *Galena Gazette*, *Galena Advertiser*, *Miners' Journal*; *Chicago Daily Journal*; United States geological survey, *Publications*; Illinois state geological survey, *Publications*; State historical society of Wisconsin, *Collections*; Wisconsin academy of sciences, arts and letters, *Transactions*; George W. Hawes, *Illinois state gazetteer and business directory for 1858 and 1859* (Chicago, 1858); John M. Peck, *Gazetteer of Illinois* (Jacksonville, Ill., 1834); [Samuel A. Mitchell], *Illinois in 1837* (Philadelphia, 1837); *History of Jo Daviess county, Illinois* (Chicago, 1878); William J. Johnston, *Sketches of the history of Stephenson county, Ill., and incidents connected with the early settlement of the northwest* (Freeport, Ill., 1854); Sidney Breese, *The early history of Illinois, from its discovery by the French, in 1673, until its cession to Great Britain in 1763* (Chicago, 1884); Alexander Davidson and Bernard Stuvé, *Complete history of Illinois from 1673 to 1834* (Springfield, Ill., 1884); William V. Pooley, *The settlement of Illinois from 1830 to 1850* (Madison, Wis., 1908); Harlan H. Barrows, *Geography of the middle Illinois valley* (Urbana, Ill., 1910); Donald McLeod, *History of Wisconsin from its first discovery to the present period* (Buffalo, 1846); Augustus L. Chetlain, *Recollections of seventy years* (Galena, Ill., 1899).

continued to the present. The opening of the great lakes and Erie canal routes in the thirties and the advent of the railroad into the county in the fifties caused the Mississippi river traffic of the region to decline, and thereafter intercourse was chiefly with the east. Then followed, as a result, a few decades in which the population increased. But since 1880 the county has suffered a slow decrease in numbers, largely owing to a further decline in its lead mining, to the rugged topography of the driftless area, and to the increasing competition of newer and better agricultural regions. Now, the county is seeking a new adjustment in American life, and this adjustment promises to be more permanent than the preceding ones. The future economic development of the region depends chiefly on its agricultural resources, and subordinately upon the development of its zinc mines.

Although excavations in ancient mounds found in the county south of the Galena river on the bluffs of the Mississippi have brought to light evidences of a prehistoric race, possibly the mound builders, little can be said about their life and culture, and it is necessary to pass at once to the Indian era.

Although the history of the Indians in the region is shadowy, it lends support to the theory that the Mississippi valley was too open to migrations of the tribes to favor the development of a high type of civilization. The vulnerable nature of the area is shown by the succession of contending human forces that have swept across the stage with almost kaleidoscopic effect. The French found easy access into the upper Mississippi by way of the great lakes and the rivers. They found that the county was a part of the land of the Illinois Indians, whose domain extended roughly from the Fox to the Mississippi rivers in southern Wisconsin and northern Illinois. These Indians were a tribe of the Algonquian family, whose territory, under an incoherent sway, extended from the east shore of Newfoundland to the Rocky mountains and from Churchill river to Pamlico sound, except that in the eastern part of this area, along the Mohawk river, there was a region occupied by the Iroquoian tribes. Presently the latter, issuing from their base, which was physically a strategic one, drove the Algonkins from Ohio and Indiana, where the open nature of the land afforded little means of defense, and

pursued them westward, until, protected in the rear by the Mississippi river and aided by the French, on their left flank, the Algonkins held firm. In this general withdrawal the Fox and the Sauk Algonquian tribes deserted their old forested home, which was probably located about Saginaw bay, and established themselves in the region about the Fox river and lake Winnebago. There presently they obtained control of the important Fox-Wisconsin portage trade route by means of forts, which were advantageously located on escarpments caused by outcrops of Niagara limestone over Hudson river shale.

In their newly occupied territory the Foxes, by exacting tolls from Indian and French traders, and by other objectionable acts, incurred new hostility. Finally, they and their Sauk allies were severely defeated by their enemies on the north and east, and both tribes retreated westward, retiring into the domains of the Illinois. Presently they encountered and defeated the Illinois, and occupied a large part of their land, including what is now Jo Daviess county. The Illinois had also suffered from the Sioux and other tribes to the north of them. Following the ejection of the Illinois, the Fox and Sauk shared with the French in ruling over the lead and zinc mining region. Presently, in the struggle between France and England for dominion in America, the British won the region from the French, only to lose it in turn to the colonies in the revolutionary war. Not until the war of 1812, however, were the British definitely driven out by the Americans. In 1804 a band of the Sauk, without consulting their allies, ceded a portion of the mineral lands to the United States government. As a result of the friction which arose from this transaction, some of the Sauk and Foxes moved westward. Then part of the Winnebago, from near Green bay, squatted on the mineral lands. Later American aggression in the region resulted in the Winnebago war of 1827 and the Black Hawk war of 1832, which forced all the Indians in the region to retire west of the Mississippi. From this summary of race movements it is clear that the area was greatly influenced by its central position and lack of natural protective boundaries.

Jo Daviess county, in the Indian era, lay in the southern part of the driftless area, but its eastern margin had a fringe of

glacial drift. The rocks were sedimentary and dipped generally and gently to the southwest, in which general direction also the surface sloped gradually. Loosely speaking, Galena limestone was the dominant outcropping rock in the northern part, Maquoketa shale in the middle, and Niagara limestone in the south. Stratigraphically the Maquoketa shale lay between the other formations and was above the Galena limestone.

The topography was that of a maturely-dissected upland plain, probably a southern extension of the Lancaster peneplain of Wisconsin, but possibly a structural plain composed of the surface of the resistant Galena limestone and overlain in part by remnants of shale. Above this plain, a series of flat-topped and steep-sided mounds and ridges known as the Niagara escarpment rose 60 to 200 feet, and below this plain stream valleys had been cut to a depth of 60 to 225 feet, with flood plains 500 to 1500 feet wide. The relief of almost every square mile was 100 feet. The northern part of the plain was young.

The soil on the Niagara limestone mounds was residual, thin, and cherty; that on the Galena limestone surfaces, less thin and less cherty; and that on the limestone escarpments, very thin. The slopes of the Maquoketa shale, being gentle, had the thickest residual soil of the region. The flood plains enjoyed a fertile, alluvial loam. Near the Mississippi front the soil was sandy and wind-blown.

The climatic environment is summarized briefly. The mean temperature for the winter was 21 degrees Fahrenheit; for spring, 48; for summer, 72; for autumn, 51; for the year, 48. The maximum range of temperature was likely to be from 106 degrees to minus 32 degrees. The mean precipitation for the winter was 4.5 inches; for the spring, 9.5; for summer, 12.3; for autumn, 8.7; for the year, 35.0. The average number of inches of snow for the winter was 27.1; for spring, 9.3; for summer, 0; for autumn, 2.7; for the year, 39.1. Not more than 12 inches of snow were likely to fall within twenty-four hours. The average relative humidity for winter was 80.5 per cent; for spring, 71.5; for summer, 71; for autumn, 75.5; for the year, 75. During the winter 53 per cent of the total amount of sunshine possible in the latitude of the county was received; in spring, 57; in summer, 66; in autumn, 55; throughout the year, 55. The direction

of the prevailing wind was northwest. It was frequently interrupted by cyclonic storms.

The drainage was adequate and dendritic. In general, the stream valleys were in a stage of youth (narrow and deep), or maturity (broader). Springs were plentiful at the contact of the impervious Maquoketa shale below the porous Galena limestone; and in general there was a plentiful supply of water except on the top of the Niagara escarpments. The Mississippi river and the Galena river, together with its larger tributaries, were navigable for the Indian canoe.

The natural resources available to the Indians were somewhat varied. Lead occurred near the top of the Galena limestone, and zinc 240 feet below, near the base of the formation. Since the rock dips to the southwest, the zinc was therefore exposed at or near the surface in the northern part of the mining area, and the lead in much the same way in the northern part of the county. But the lead was overlaid by a varying amount of eroded Maquoketa shale in the middle portions of the county (except where exposed by stream erosion), and by the Niagara mounds as well in the south. Traces of silver occurred with the lead. Early descriptions of the flora of the region speak of abundant plant life. A hardwood forest, covering from one-tenth to one-fifth of the area, was located chiefly on the mounds, the steep slopes, and along stream courses. The rest of the area was chiefly in "oak openings" and more extensive prairie tracts. According to early descriptions, from one-third to one-half of the land was fit for some sort of agriculture. Early writers speak of a fair abundance of fish, but omit much detail concerning the animal life of the country.

Amidst such scenes lived the Indians. Their numbers and distribution cannot be stated accurately. The population of all the Illinois was estimated in 1750 to be between 1,500 and 2,000. But by 1775 they had been almost exterminated. In 1650 the Foxes were thought to total about 3,000; but by 1805 they were reduced to about 1,200. The Sauk were somewhat more numerous. The Winnebago were reported to number 1,800 in 1750. Some idea of the distribution of the Indians of the region can be obtained from figure 3. In general the Fox tribe occu-

pied the Rock river area. It has been stated for Wisconsin that "considerations of food supply, means of transportation, and of defense in time of war, caused the principal Indian villages to be located at such key points as portages, the mouths of rivers, and on important lakes and bays."

The material culture of the Sauk, Foxes, and Winnebago has been described as being typical of the woodlands, with some intrusive features from the plains. Probably this fusion was a result of their change in abode from the wooded region about the great lakes to the semi-prairie lands of the mineral country. In summer they lived in permanent villages, and cared for their crops; in winter they lived a semi-nomadic life, hunting wild game.

The presence of lead was long known to them and it is estimated that they did some mining a century before the arrival of the Europeans. But there is little evidence concerning their use of it, until the introduction of firearms by the French. The latter learned of the deposits probably as early as 1658. The position of the lead near the surface of the ground and near the top of the Galena limestone made shallow mining possible over large areas, and thus permitted Indian operations. The aborigines skimmed only the surface as a rule, loading the ore at the bottom of the inclined shafts into deerskin bags and hoisting or dragging it to the surface by means of thongs of hide. The lower work was performed almost entirely by old men and squaws. With the coming of the French, the new use of the mineral by the savages in warfare and hunting, both for bullets and as currency, gave the lead an increased value to the Indians. Moreover, the whites taught them less crude methods of mining, and bought mineral of them. Under the direction of the Europeans, therefore, mining by the Indians developed more rapidly; in 1810, for example, they produced 400,000 pounds of lead. In the war of 1812 they aided the British by mining lead for them. There is even an official statement of 1811 to the effect that the Foxes, Sauk, and Iowa of the mining region had largely abandoned the chase in favor of mining. But in the aggregate, the production of lead by the Indians always remained small. It should be kept in mind, however, that although the Indians made but small use of the mineral quantitatively, its presence was



fatally important to them in that it hastened their expulsion from their land by the covetous whites.

Prior to the coming of the whites, hunting and fishing were the chief economic activities of the Indians, especially the Sauk and Foxes, who came from the woodlands of the east. They must be credited with having made considerable use of the soil, however, for agriculture was followed actively and was second only to the chase. In 1634 Nicolet found the Indians in Wisconsin cultivating large fields. The Sauk and Foxes had large farms along the Wisconsin, especially in the fertile Sauk prairie (Prairie du Sac), while the Winnebago tilled the land along the Fox river and lake Winnebago, cultivating some 3,000 acres, for example, near one village of 500 inhabitants. Later, these tribes cultivated some of the land within Jo Daviess county. The chief crops consisted of corn, tobacco, melons, pumpkins, beans, and squashes; wild rice was also important, and wild fruit. Horses and cattle were unknown; but the buffalo was a source of food.

Manufacturing by the Indians was of the home type. While in the eastern wooded area, they had used canoes and dugouts, but they learned to make the bull-boat on coming out upon the plains. They made their own clothing, tools, and arms. But they soon learned to get many of these things, including mining equipment, from the whites. In 1815 there were twenty Indian furnaces near Galena.

Their commerce was extensive, because of the network of waterways available, but not bulky, because they had nothing but man power for transportation. Their trade consisted chiefly of furs, lead, and tribal specialties. The chief routes were the Mississippi, the Fox-Wisconsin waterway, and the great lakes. Well-known rendezvous were Prairie du Chien, Mackinac, and Green Bay. Early in the eighteenth century lead became a regular article of commerce between the Indians and the French and Canadian trappers and traders. A peck of ore was worth a peck of corn in Indian trade. Presently Galena became the permanent trading post within the region, since it was located near the head of the navigation of the Galena (Fever) river, the principal tributary to the Mississippi from the mining region. The earliest route of export for the lead was northeast to Mont-

real and Quebec, so long as the French controlled the region. After the French and Indian war, the product was shipped down the Mississippi.

In the interaction between the Indians and their environment, it is to be noted that the savages affected their surroundings but little; they took meager toll, and they gave little in return.

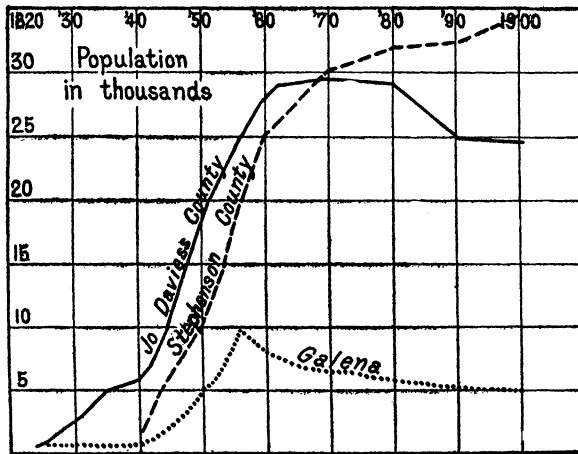


Figure 2. Graph showing the comparative growth in population of Galena, Jo Daviess county, and Stephenson county.

With the advent of the whites there came pronounced changes in the life scenes of the region and their physical setting. The new culture displaced the older, and modified the bio-geography and physiography of the region, as well as itself being modified by all three. On the basis of the use made of the natural resources there have been three periods in the era of development of the region by the whites. While the lead was essentially the sole resource being exploited, there was a period of typical mining life (1800-1832). Presently, agricultural and other resources were tapped; although the lure of the mineral wealth remained dominant, agricultural and manufacturing activities began to compete with the purely mining interests. This stage constituted the mining-farming period (1832-1850). Finally, the agricultural resources became the most valuable, so that the county came to be a region of farmers, with a sprinkling of miners, manufacturers, and others. Thus began the farming-mining period, which has continued to the present time.

The minerals were the natural resource which first attracted the whites to the region. A Frenchman, Nicholas Perrot, was probably the first white man actually to see the lead mines about Galena, in 1690, and he may be considered as their European discoverer. During the next fifty years a number of French expeditions were sent into the area to explore for precious metals, rumored to be abundant along the Mississippi river; but none were found. Hence the European commercial world lost interest in these attempts, and in the region. One prospector, however, presently attained success, namely Julien Dubuque, a French-Canadian, who somehow maintained friendly relations with the Indians and mined profitably in the lead mines of the neighboring Iowa district about the site of present-day Dubuque. But after Julien Dubuque's death in 1810 the Indians obliterated all marks of his operations. On the whole, little mining was done in the region by either the French or the English.

Both the French-Canadians and the Indians were hostile to the early American prospectors: the French because they desired to maintain the monopoly of the lead trade, and the Indians because the Americans were aggressive and threatened to dispossess them of the region. But geographic conditions favored the Americans, for the Mississippi route, used by the Americans, was more direct than the French-Canadian route by way of the great lakes, and the Americans were the more numerous. Following the government purchase of part of the Galena mining region in 1804, many prospectors came to the district. The close of the exploring epoch and the beginning of active, systematic mining on a large scale was marked by the arrival of Colonel James Johnson early in 1823, who came with soldiers, supplies, competent miners, and 150 slaves.

The mining period had now been launched, and in a few years "this sequestered spot literally swarmed with (10,000) miners, smelters, merchants, speculators, and gamblers of every description." They came from all over the United States, especially from the south, and from Europe. The growth in population of Jo Daviess county (established in 1827) is shown in figure 2; the distribution of the early settlers is shown in figure 3.

The new inhabitants made greater use than had their predecessors of the natural resources, especially of the lead. Figure

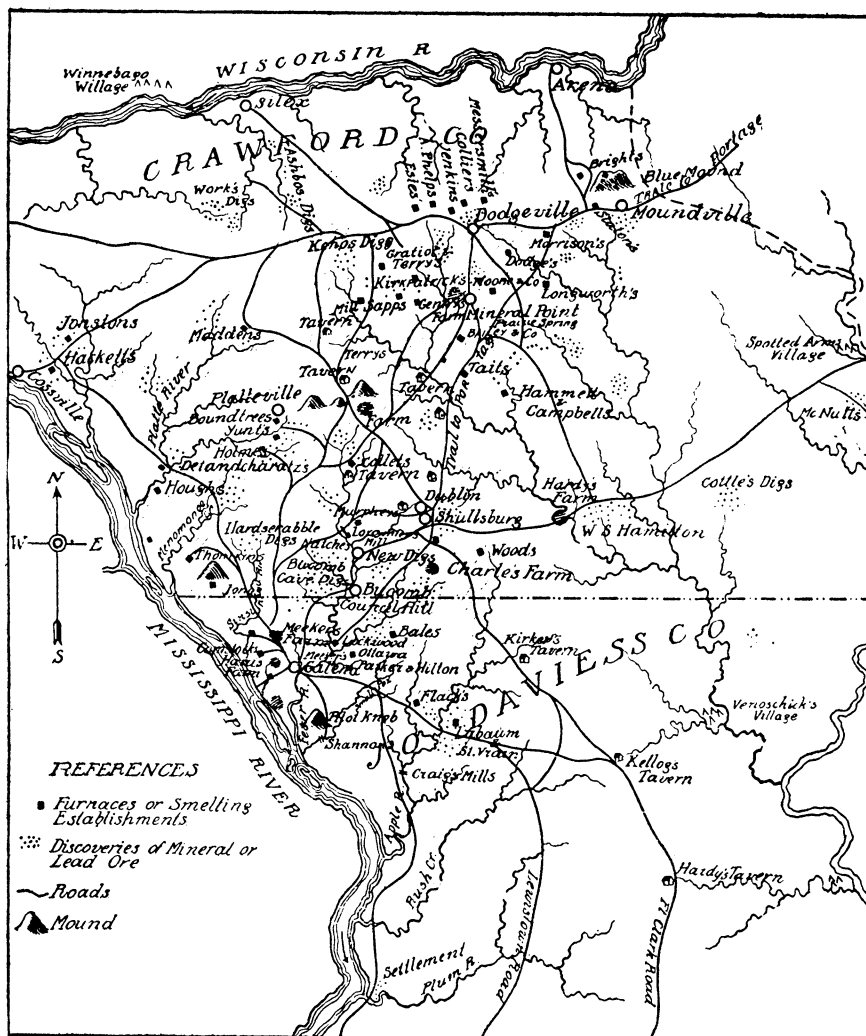


Figure 3. Map of the United States lead mines on the upper Mississippi river, 1829, based upon a map in State historical society of Wisconsin, *Collections*, 11: 400.

4 gives the output of the lead in the whole mining region, of which area by far the most productive part was the district between Dubuque, Galena, and Schullsburg. At times as much as nine-tenths of the lead mined in Illinois came from an area enclosed in a circle having a radius of four miles, with its center a little northeast of Galena. The value of the lead taken from

the mines of the upper Mississippi between 1821 and 1865 was estimated at \$40,000. Since the mineral was near the surface, sinking the shallow shafts was “as simple a process as the method of digging wells,” and therefore mining was carried on by individuals rather than by companies. The miners drew heavily upon the timber to aid their operations. They also en-

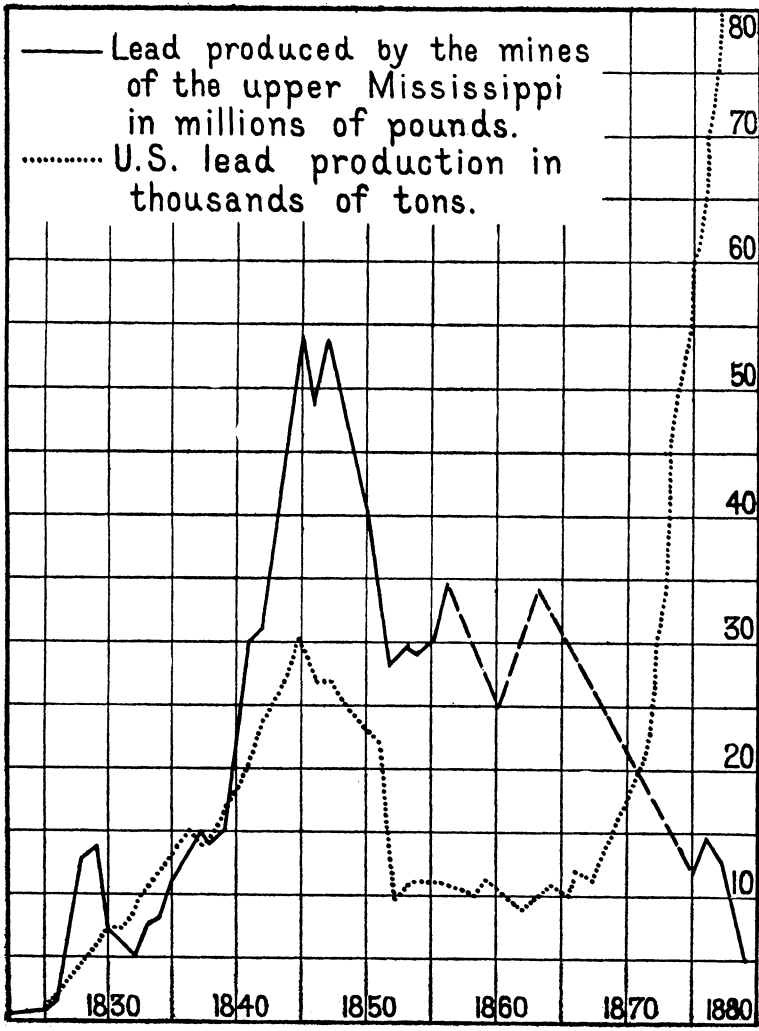


Figure 4. Graph showing the comparative production of lead in the United States and in the upper Mississippi district. The broken line indicates uncertain data.

couraged farmers to settle in the region to ensure a sufficient food supply, but in this they were at first only partly successful. Smelting was the only important industrial occupation.

The possession of mineral wealth made the securing of transportation especially important for the Galena district. The ore was taken to the smelting centers, and the lead hauled to Galena over steep, winding roads to be exported. Efforts to reach the outside world overland began in 1825, when Kellog made his trail from Peoria to Galena. Presently wagon roads were also opened to Chicago and Milwaukee. But owing to the high cost of land transportation, and the advantages of the Galena-Mississippi waterway, these land routes were far inferior to the Galena and Mississippi rivers. Therefore the region faced south commercially. The first steamboat came to Galena in 1822, and regular steamboat traffic was established in 1827.

Lead was the chief commodity of export, and food and manufactured goods constituted the leading imports. The natural advantages which had made Galena an important Indian trading post now caused it to become the emporium of the region.

During this period the environment was fully as important in affecting the life of the region as in Indian days. For example, the number and movements of the heterogeneous, adventurous, mining population fluctuated with the varying successes in the "diggings." Led on by his passion, the hopeful miner, digging in his dark, crooked hole, was always sure that "he was nearing it now," that the "lucky day" was not far off. The seasons also had a direct effect in that during the winter the population of Galena was increased considerably by restless, unemployed rivermen who engaged in steamboating during the summer. Another influence was the nature of the topography of the site of Galena. The foot of the town was located on an alluvial terrace, the rest along the bluffs of the caverned Galena limestone. As a result, the streets were in contour, and the shifting inhabitants were crowded into narrow quarters. Therefore many of them lived in clefts and caves in the rock. Again, since nearly all the imports had to come up the river from St. Louis, household and personal effects were reduced to those of the most essential nature. The isolation of the region rendered federal authority weak; hence social and political relations were primitive, gambling was common, and the "law of honor" prevailed.

But locally organized justice, though rude, was quick, so that claim jumping was infrequent and unruly characters were often expelled roughly from the town. It is further important to note that the settlers were isolated among the Indians, and consequently were in constant danger of sudden attack. Its exceptional resources gave the region at times international importance, and bestowed upon it for a considerable period great local importance in the west; its exceptional opportunities attracted many desirable men: bankers, merchants, politicians, and lawyers; but they also invited adventurers from far and near. Three incidents are chosen to illustrate the heterogeneity of the population. In 1829, a minister, Erastus Kent, asked to be sent to a place "so hard that no one would take it," and was sent to Galena. Yet in this frontier district, Greek and Latin were being taught in Gratiot's Grove; and the wife of Alexander Hamilton came to visit her son, a common miner who like the rest was wont, in the spring months, to wade knee deep in mud on the clay streets of Galena. As has already been suggested, however, the predominant characteristics of the institutions and of the people were southern, as might be expected in view of the fact that the economic relations of the region were chiefly with the south.

The white inhabitants influenced their environment more than the savages did. For example, they greatly changed the biogeography by reducing the forests, by exploiting the fish and

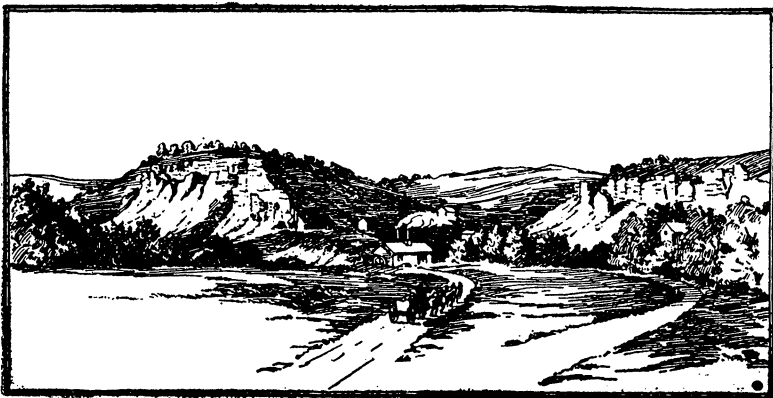


Figure 5. Sketch of a scene in early days of Jo Daviess county: lead-bearing rocks and furnace near Galena.

game, and by introducing domestic animals and plants. Their numerous shallow diggings affected appreciably the topography and the drainage of the land. Furthermore, their own presence, as a group, constituted an important new factor in the environment of the region.

But a change presently took place in the life of the region, for farmers came in large numbers to settle and possess the land. A quarter of a century was to pass, however, before they could dominate the region. As early as 1828, farmers were daily settling in the vicinity of Galena, and before the Black Hawk war a few people had settled in secluded ravines along the Chicago-Galena route. After the close of this war, which advertised the region and resulted in the removal of the Indians, the immigration of the farmers assumed large proportions. The magnitude and rate of the inflow is suggested by figure 2. Between 1830 and 1860, except during a lull brought about by the panic of 1837, farmers came pouring in; for instance, in the year 1839, they paid from \$300,000 to \$400,000 in "proving up" their preëemption rights. The majority of the newcomers were not from the south, as had been the early miners, but came rather from the middle and eastern states, especially from New England and New York.

Even though the mineral products continued to outvalue all others during this period, our interest now shifts to agriculture, since it was destined to dominate the region eventually, and since it marked the advent of a closer relation between life and environment than in the case of the mining industry, which was merely extractive. During this time a description of the country states that the western and northwestern townships were "generally timbered, hilly, rocky, and even bluffy;" that the eastern and northeastern ones were "generally prairie with rich, warm, deep soil," though towards the center and south there was undulating country with scrubby timber; that the central townships were "generally uneven and partly timbered;" and that the southern tier was "uneven with some prairies." In 1850 (near the close of the period) some 198,150 acres within the county, out of a total area of 398,720 acres, were classed as farm land. Of these 60,311 acres, or thirty per cent, were



classed as improved. Agriculture first became important in the region in 1829. By 1840, there were 876 farmers in the county as compared to 617 miners. In 1842 the region began to export breadstuffs. Products of the farm outvalued the mineral produced in the county certainly as early as 1860, probably as early as 1855, possibly even earlier. Corn and wheat were the chief crops; the other common products were hay, potatoes, oats, rye, barley, and flax. The rugged topography encouraged cattle raising, which soon became important. In the early days the prairie portions were avoided by the settlers.

The new culture introduced manufacturing on a small scale into the region to meet the most pressing needs of the pioneer settlers, in particular wood and flour. The first sawmill in the county was established in 1827, and the first gristmill a year later. Fortunately there was an abundance of small water power sites for these small establishments. Figure 3 gives the location of the early smelters and mills. Although manufacturing in the county had the advantage of an early start, it did not develop steadily in early times, and was essentially local, involving (1) commodities which, because of the expense or other difficulties of transportation, could not be brought profitably into the district, but for the making of which raw materials were at hand, and (2) commodities for which the raw materials were in excess in the region. Manufacturing was handicapped in several ways. Capital and labor for such purposes were scarce, being attracted chiefly to agriculture and mining. There was also a lack of adequate power; the water power sites were small, coal was not readily accessible, and timber fuel soon was practically exhausted, so that it was being imported as early as 1842. Another influence against industrial development was the fact that the processes of manufacturing lead were not well known in the region, so that the finished product was not much less bulky than the metal, the market for either of which was far to the east. The region, further, was shortsighted in depending entirely on wholesale trade. The following summary shows the modest rank of manufacturing in the county for 1860. By 1858 Galena had become the chief manufacturing center of the county, owing to its population, and its commercial and mining importance.

*Manufactures of Jo Daviess county in 1860*

Products	Number of establishments	Hands employed	Value of products
Flour and meat.....	11	27	\$272,979
Lead smelting.....	5	39	254,900
Agricultural implements.....	4	41	55,710
Carriages .....	9	32	41,515
Clothing .....	2	45	37,000
Provisions, pork, etc.....	2	11	35,711

As in the mining period, the commercial intercourse of the region continued to be largely with the south, with the same results. The scale was merely larger. This period formed the epoch of the supremacy of the steamboat on the Galena river, 1835 to 1855; the decade 1840 to 1850 marked the climax, when boats from Galena touched at all important points between St. Paul and New Orleans. The following table summarizes the history of the steamboat in the county.

*Arrivals of steamboats at Galena, 1828-1848*

Year	1828	1830	1835	1836	1837	1838	1839	1840	1841	1842	1848
Arrivals	99	50	153	182	350	308	275	300	350	350	268
										-400	

Since this decade marked the zenith of lead production within the region, it also marked the zenith of its external commerce, and therefore the climax in the history of its principal city, Galena. In 1840-1850 the "Lead Mine City" was held to be the most important metropolis of the northwest. Often as many as twelve or fifteen steamboats were seen at her wharves at one time.

Environment played an important rôle in the life of this pioneer period. (1) It had much to do with the distribution of the people. The outcrops of impervious Maquoketa shale under porous Galena limestone determined a horizon of springs. This horizon in many instances can now be traced by the location of the abandoned pioneer cabins, which were distributed near the springs. Other important factors which influenced the distribution of the people were the lead, the terraces, streams, productive soil, and existing towns. (2) Isolation decreed that the settlers should have only the bare necessities of life. Rude huts of rough-hewn logs were the rule. Clapboard doors, clay chimneys, and puncheon floors were in harmony with the homespun

garments. (3) Though the county was still isolated to a large extent there were movements on foot to bring it into contact with and under the influence of an ever widening environment. The extensive lead trade, connecting Galena with St. Louis, New Orleans, and New York, tended to bring the conveniences of civilization into the region at a relatively early stage. (4) The county was experiencing the influence of both the north and the south. The northern strip of Illinois had been taken from Wisconsin and added to the former state to make it a "northern" state, with a frontage on lake Michigan. Roads were being pushed westward from Chicago in 1829, and from Milwaukee in 1839, and were endeavoring to dispute the commercial supremacy of the Mississippi river route. The Illinois-Michigan canal diverted eastward some of the lead trade. The vote of the lead townships ordinarily was that of the south, of the non-lead communities that of the north, thus indicating the principal source of the miners and the farmers, and the influence of the mother land. (5) Within the region the rough topography was exacting a heavy toll in time, toil, and money, from the farmer, the miner, and the trader. (6) The greater rise in population occurred in the lead townships. (7) The miners refused to sell their lead for paper money during the early mining period, and as a result, English gold flowed into the region. Therefore, it is said, the panics of 1837 and 1857 were felt less severely here than in many other places. On the other hand, the element of chance in mining increased the evils of speculation to an even greater degree than elsewhere along the American frontier.

Not only did the environment affect the life of the pioneers; in turn the mining-farming life reacted upon its surroundings more effectively than had any previous life in the region. For example, the virgin land was transformed into farms. A government report for 1844 states that the forests of the county had been badly damaged by fire, that the uplands had largely been cleared for agriculture, but that the bottoms had so improved in timber growth that there was perhaps more timber in the county than ever before. No reforestation was then in progress. Further, careless and ignorant methods of agriculture on the steep slopes initiated soil wash, floods, and the silting of the Galena river. Again, there was a great waste in mining, esti-

mated at \$50,000. Chiefly because of the activity of this region, the United States began to export lead in 1841, and ranked first in its production in 1845. Finally, within the region there was coming about a blending of northern and southern influences, and the production of a new type of social environment.

But now changes of great importance for the region were at hand. The lead mines became somewhat exhausted; furthermore, the Galena and Chicago Northwestern railroad (note the relative importance of Galena and Chicago as shown in the position of the two words) reached Galena in 1855, and was extended northwestward; other lines followed soon. There were three main results: there was a final, complete settlement of the county; the region came to face east commercially and no longer south; and the area no longer stood out as an isolated unit, but became absorbed in the quickening life of the Mississippi valley and of the nation. The farming-mining period had arrived.

With this rapid settling of the upper Mississippi valley, the establishment of intimate communication between Jo Daviess county and its wider environment, and the waning mining fortunes, there followed in the county a brief epoch of rapid increase in population, then an epoch in which the numbers remained essentially stationary, and lastly the present epoch in which the population has been slowly decreasing as the county adjusts itself to its wider environment.

Since 1860 the mining industry in the county, though fluctuating, has been declining in relative importance. This has been due largely to the exhaustion of the lead mines in the driftless area, to competition of greater mining sections without this area, to speculation, and to the fact that in the county the zinc ore is deep beneath the surface. Mining has now sunk to a position third in importance, ranking below agriculture and manufacturing. Recently the zinc industry in the driftless area has been improving in a measure, but the area of noted improvement is farther north than Jo Daviess county, for north of the county the zinc is near the surface, whereas within the county it is deeply buried and beneath the ground water level.

Agriculture has ranked first in the county since the beginning of the farming-mining period. In general the crops are those of pioneer days, produced on a larger scale. Owing to poor crop

rotation and the competition of the wheat fields of the north and west, wheat has declined relatively. As agriculture in the region gradually adapts itself to the ruggedness of the topography and the pressure of better endowed competing cereal lands, forage crops and animal industries, particularly dairying, are gaining in importance.

That the physiographic characteristics of the driftless area are still a potent economic factor is indicated by the following comparison. Jo Daviess county is essentially a region of stream erosion. Stephenson county, adjoining on the east, is similar, except that its pre-glacial topography is masked by glacial deposits. Stephenson county has had a greater amount of improved, but a smaller amount of unimproved farm land per square mile; a greater value for its agricultural machinery per farm acre; higher priced land; and a greater variety of crops; and it has produced more per farm acre than Jo Daviess county. Furthermore, the population of Stephenson county has continued to increase, while that of her neighbor has been decreasing for more than thirty years. These figures imply that Stephenson county has been able to sustain a larger population than Jo Daviess county, and that as a whole, Stephenson county is the richer economically. But it does not follow that some of the better farms of the former have not been as productive as those of the latter. Nor does it follow that Stephenson county is the happier economically for the individual.

The influence of topography, soil, and accessibility to market on the economic life of the region is reflected in the present value of land in various parts of the county. In the vicinity of Elizabeth and Galena, where the maturely dissected, resistant Galena limestone presents a rough topography, land sometimes sells as low as forty dollars per acre, a price which also is characteristic of the broken upland of the Niagara limestone in the south and southeast parts of the county. Some of the bluffs and the sandy bottoms along the Mississippi river have sold recently for twenty-five to thirty dollars per acre. Near Stockton, a thriving city, the rough Niagara limestone ridges are said to command sixty to seventy dollars per acre, whereas the gentler Maquoketa slopes are worth one hundred dollars. In this vicinity one hundred sixty dollars per acre is paid for farms on the flat

upland covered by glacial deposits. One parcel of this land is said to have sold for three hundred dollars per acre. Factors other than those named help to determine land values in the county; but in a general way the preceding figures illustrate the variations which are found in different geographic divisions of the region.

The general development of manufactures within the county during the period is summarized in the table below. Flour and gristmill products, largely for home use, have been most important. The meat packing industry, stimulated by the growth of animal industries in the region, once led; but that business has now been absorbed by Chicago and other centers. The outlook for extensive manufacturing is not good.

*Growth of manufacturing in Jo Daviess county*

Year	Number of manufacturing establishments	Wage earners (employees)	Capital invested	Gross value of products
1860	69	266		\$ 620,860
1870	133	786	\$ 830,375	1,252,515
1880	194	925	1,695,299	1,790,197
1890	113	757	861,756	979,225
1900	194	526	1,036,498	1,071,353

The greatest factor in the economic history of the county for the period has been the commercial change. When the county had exhausted its special endowment of lead and when good railroad communications had been established between it and surrounding regions now well settled, it began to face the crucial test of mobile commerce, which tends to bring out the truth concerning the natural endowment of a region and the capacity of its people. Facilities for communication tend to unmask the true nature of a region somewhat as intimate acquaintance reveals the individual, and somewhat as the city tests the immigrant from the country. Along the more important economic results of this change brought about by the railroads were the following: (1) This region as a part of the northwest, became at last bound firmly to the eastern and northeastern states commercially; these trade relations were cemented more closely because the railroad facilitated the immigration of easterners. In commerce the region now faced east instead of south. (2) Agriculture was helped by the better facilities for transportation,

and this in turn reacted favorably upon the other industries of the region. But on the other hand the agriculture and other industries of the region had to face the keen competition of other regions in many respects better endowed economically. The cheaper the transportation, the closer the competition. Therefore presently the county had to retrench and readapt itself. (3) The decline in the river transportation, for which Galena was peculiarly well situated, together with the falling off in the production of lead, initiated the slow decline of that city; this is shown in a general way by figure 2. As the emporium of the region, Galena had depended almost entirely upon her wholesale trade. Freeport, Warren, Apple River, Scales Mound, and Mineral Point were now situated almost as advantageously, with reference to the railroad, as was Galena, and all absorbed some of her trade, as did Chicago and Milwaukee. As a result Galena came out of the financial depression of 1857 no longer the metropolis of the northwestern part of the state and much of the driftless area, but merely as the leading city of Jo Daviess county. The decline in the importance of Galena also tended to decrease the importance of Jo Daviess county as the center of mining activities. (4) On the other hand Galena and the whole region began economically to grow more varied and symmetrical, and less provincial, than before.

The economic response of the region to what may be termed its broader hinterland environment is seen in the history of land values. In 1850 farm land in Jo Daviess county was worth \$6.60 per acre. With the steady rise in land values in the United States land values in the county have risen, the figures being \$34.00 in 1900 and \$55.29 in 1910.

Finally, in considering the reaction of the environment upon the work-a-day life of the people, it is significant that the mining townships are now economically inferior to the others notably in general land values, and in per capita personal property and real estate.

Only a few of the social and political aspects of this period can be noted here. As a consequence of the strengthening of its relations with the east and the north and of the immigration from those regions, the county, like the state of Illinois, cast its fate with the north during the civil war. This helped the north-

west to send a vast amount of foodstuffs to the eastern states during the war, and to receive manufactures from the eastern factories.

In response to the economic changes which have been discussed, and also as a result of the fact that one man with improved farm implements can now cultivate more acres than formerly, there has been a decline in the population of the county, especially in the rural districts. It is instructive to note that the greatest decline has been in the lead producing townships.

It is pointed out by some that the inhabitants of the lead townships have been slow to adjust themselves to changing conditions, and that "the greater the importance of lead mining in the early days, the more marked the decline and stagnation of the later periods." It would be difficult to say to just what extent the results noted are due to the former presence of the ore, and to what extent they should be attributed to the rugged topography of the lead region with its underlying Galena limestone. But the mellow spirit of Galena with its gray bluffs, terrace-like streets, quaint stone houses, and old men meditating upon the glories of the past, is in striking contrast to the modern, mercenary atmosphere of active Stockton, which is not in the mineral region. It is interesting to note incidentally that there are more foreign born in the lead townships than in the others.

The present culture has affected its environment more than did any of the preceding stages. Figure 2 shows the change which has come about in the population. In 1850, some fifty per cent of all the land was in farms and about fifteen per cent of all the land was improved; in 1910, the respective figures were ninety and four-tenths and sixty-four percent. The average size of the farms has been increasing, and tenant-farming has become more general. The value of farm machinery per farm acre in 1850 was forty-eight cents; in 1910, one dollar eighty-four cents. The number of domestic animals, and the variety of domestic plants, has been steadily increasing.

Probably the most striking effects of the present culture upon the environment are seen in the deterioration of the soil, increased erosion, silting of the water courses, and the neglect of



forestry. Within recent times, efforts have been made to better these conditions, but thus far these efforts have been only partly successful.

The social institutions and conditions now differ from those introduced by the immigrants who came in turn from the south, the east, and the north. Each group has been modified by adjustment to its physical and social surroundings and by changes within itself.

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